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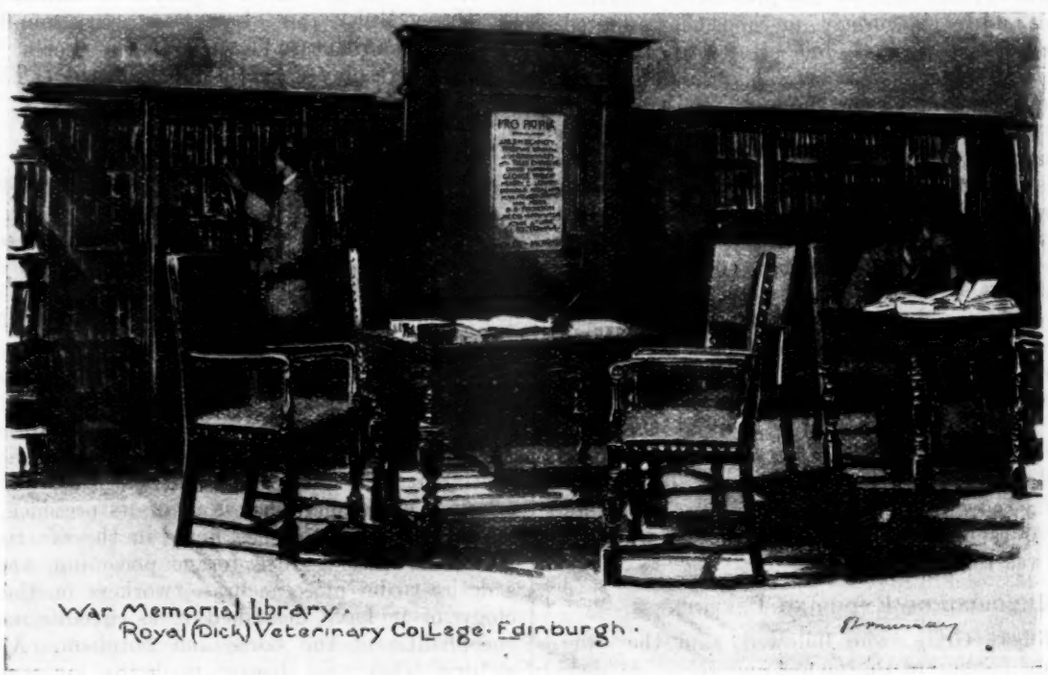
Royal (Dick) College War Memorial.

NEW LIBRARY INAUGURATED.

The Royal (Dick) College war memorial, which takes the form of a library and tablet bearing the names of fourteen graduates and students of the College who died in the war, was unveiled on June 13th, in the College buildings, Edinburgh, by Sir Robert Greig, M.C., LL.D., chairman of the Board of Agriculture for Scotland. Prior to the ceremony, the large company met in the hall. Sir John Rankine, K.C., chairman of the Board of Governors, presided, and among those present were Sir Robert Greig, the Rev. Professor Kennedy, the Rev. Dr. Harry Miller, Sir David Wallace, K.B.E., C.M.G., President of the Royal College of Surgeons of Edinburgh; Principal O. Charnock Bradley, President of the Royal College of Veterinary Surgeons; Professor Wallace, Colonel Queripel, Colonel MacCullum, Major Preston, Dr. John Horne, Mr. Harry Rawson; Mr. Thomas Kirk, of Abbey Mains, Hadington; Mr. Alexander Cowan, of Valleyfield, Penicuik; Mr. H. D. M'Combie, Convener of Aberdeenshire; Councillors Keddie, Douglas Elliot, Rose, Garden, Watt, Dickson Wilson M'Laren, and Gardner; Dr. Lauder and Major Blackburn, of the East of Scotland College of Agriculture; Mr. J. M. Ramsay, of the Board of Agriculture; and Mr. F. P. Milligan, W.S., secretary of the College.

After prayer by the Rev. Professor Kennedy, D.D., Principal Bradley asked the chairman of the Board of Governors to accept custody of the memorial. He said that in determining the form the memorial should take the Committee were influenced by a wish that it should be something living and capable of growth. It seemed that a library would be most fitting. They took, therefore, as a nucleus the existing library of the College, which contained some of the books that originally belonged to the founder of the school, including the first book on veterinary science purchased by William Dick as a young man. They trusted that the tablet and the library might be a help and an inspiration to the present and to future generations of students.



War Memorial Library.
Royal (Dick) Veterinary College. Edinburgh.

Sir John Rankine, in accepting custody of the memorial, said the Governors would treasure the memorial with that meed of veneration and reverence which was due to the noble sacrifices of those men whom it commemorated.

Veterinary Corps' Part in the War.

Sir David Wallace said it was a privilege to be there as the President of the Royal College of Surgeons. The relationship between the medical profession and the veterinary profession was an extremely close one. Indeed, it was being recognised more and more that each could help the other in manifold ways. It was quite obvious that just as medical men could get much information from a study of diseases in other animals than the *homo*, so he thought it had been recognised, and was being recognised more and more, by the veterinary profession that they benefitted largely from the scientific work done in the medical profession, and he hoped that the relationship on the scientific side of those two bodies would become more intimate as time went on. During the great war transport was mainly carried on by mechanical means, and he thought perhaps it was scarcely recognised how important a part was played by horse transport. The Army Veterinary Corps played an extremely important part in connection with transport in keeping the horses and mules in a fit condition for the work which they had to carry out. The corps was not a very large one, but the work it did was truly magnificent, and he was certain that by the preventive measures they used, and by the curative methods they adopted, the horses in the war were looked after in an extraordinarily excellent manner. The arrangements made were very much on the same lines as those made by the R.A.M.C. So far as contagious diseases were concerned, it was gratifying to know that the corps was able to prevent any contagious disease doing much harm. (Applause.) Perhaps for the first time in any campaign of any magnitude the disease of glanders, which was a dangerous one when once it got hold, was practically entirely avoided. He believed that was almost a record in connection with Army work. The King had recognised the work of the Army Veterinary Corps, and the excellent service that was given by the members of the corps, and he thought he was right in saying that, as the result of the work it did during the war, it was now known as the Royal Army Veterinary Corps. That was in itself some recognition of those who did so much, and who gave their lives in this service, to whom all honour was due.

Memorial of Enduring Usefulness.

Sir Robert Greig, who followed, said they were met to do honour to the memory of the great dead, and on that occasion, as on other similar occasions, they must feel the admiration, the regret, and the hope which were the flowers on the grave of a great sacrifice. Their admiration must be unstinted for those who did their duty so thoroughly and completely that they fulfilled their lives almost before these lives had begun. They must feel regret that at this time, when the world was in greater need than ever before of the energy and the hopefulness and the idealism of youth, so much of youth had been wasted. That occasion differed from most other occasions in one respect. A parish or a city memorial was one to all ages and classes of those who fell. That memorial was to one professional class, the students and graduates of the Dick College. He congratulated the Committee on the form which it had taken. It was a memorial which would have an enduring usefulness which, merely by the provision which it made for study and for the acquisition of knowledge, would bring somehow good out of this war. But its effects were more than these. It set up a tradition of duty done. It must influence, consciously or unconsciously, the students of that College. The students were setting out upon a career in which they could not hope to acquire wealth, but in which, more fortunately, they could attain scientific distinction, and, still more fortunately, in which they could do great and useful services to the community. In that library they would honour the sacrifice, they would sympathise with the relatives and friends of the fallen, and they would have hope and confidence in themselves, knowing that though dead their spirit lived for ever, and that they also shared in that spirit.

On adjourning to the library, a prayer of thanksgiving was offered by the Rev. J. Harry Miller, D.D., Chaplain, O.T.C., and the tablet was unveiled by Sir Robert Greig. After a prayer of dedication by Dr. Harry Miller, the "Last Post" was sounded by a bugler, and the "Flowers of the Forest" and Reveille were played by the pipers of the O.T.C.

Grass Disease in the Horse.

By Wm. Nairn, M.R.C.V.S., Blairgowrie.

(Presented to the Scottish Metropolitan V.M.A.)

It seems an extraordinary position for one to be in to come before you with remarks on a disease the correct name of which cannot be definitely determined, the cause of which has not been definitely proved, and in the treatment of which it is still impossible to lay down rules which would lead to a good percentage of successful issues.

This disease, which we term grass disease or grass sickness, has been termed Borna disease on the continent, as it was in the district of Borna, in the province of Saxony, that it made its presence felt as a serious enzootic of the horse in the nineties. In America it was termed forage poisoning, and, with a desire to be more accurate, workers on the pathology of it have described it as enzootic meningo-encephalitis of the horse and botulism. Although at first when this disease made its appearance in Forfarshire it was considered a mysterious new disease of horses, we now recognise that it is an affection of world-wide prevalence. On the continent it has caused at times a very serious mortality in certain districts, and we find records there of a similar disease which trace back for almost one hundred years. Whatever alterations in its nomenclature the determination of the real etiological factor may produce, to the farmers of Forfarshire and Perthshire, it will ever remain grass disease. We are convinced it is mainly a disease of agricultural horses, but they need not be at grass, as numerous cases have been observed

in animals which had not been at pasture for at least six or eight months. Instead of grass disease it might be more correct to term it forage poisoning, but since we are sure it is of a bacterial origin, even that title would still be inaccurate. In Scotland we have two opinions as to the etiology of this disease, and in America opinion is likewise divided. There the disease was known as cerebro-spinal meningitis of horses and forage poisoning, but Graham in 1917 claimed that it was due to the *Bacillus botulinus*. Dr. Tocher later made a similar claim for grass disease in Scotland.

Professor Gaiger in 1921 found, in pure culture, from the cerebro-spinal fliud of a case sent to the Glasgow Veterinary College, an organism which he termed a *diplo-streptococcus*. He also pointed out that the symptoms and *post-mortem* appearances were similar to the disease first described as affecting horses in the province of Borna.

It has yet to be shown whether the disease will be known as meningo-encephalitis or botulism of the horse. Dr. Tocher and Mr. Buxton claim to have demonstrated that grass disease is botulism, but many difficulties must be overcome before these findings can be accepted as proved. To isolate by cultivation an organism from among the many in the alimentary canal, and to produce the death of other horses by injecting that organism or its toxin, is barely sufficient evidence that these have produced a disease similar to a natural infection.

One difficulty, I should think, is the fact that in both grass disease and botulism the visible symptoms are mostly secondary to perverted function, and although arising from different causes might have many similarities clinically. The *Bacillus botulinus* is as likely an organism as any to be filling a harmless part in the alimentary canal, as most workers incline to the view that its toxin production takes place mainly outside the body. To pursue a successful existence it must enjoy anærobic conditions of life, and one wonders if grass exposed to sunlight and air would fulfil its requirements. If we had been dealing with ensilage, it might have found more ideal conditions. The exponents of the botulism theory express the view that the *diplo-streptococcus* of Borna is a secondary infection and quite non-pathogenic. Professor Gaiger showed that it was highly pathogenic for laboratory animals, rabbits and sheep. I may mention here that on a farm much troubled with grass disease last year I met with a serious outbreak of a similar trouble among sheep in the month of June. Out of 48 ewes 19 died, and 7 were very ill, but recovered. The symptoms and *post-mortem* appearances were similar to those of grass disease in the horse. Kraus, in the Argentine, has repeatedly infected horses with this same *streptococcus*. This organism has not yet been demonstrated in the brains of horses which have died of other diseases. Professor Gaiger and various other workers in following up the streptococcic theory have shown that there is evidence of an encephalitis in grass disease, and Professor Gaiger has demonstrated the *streptococcus* in the nerve cells.

Until it is definitely settled what is the correct etiology, we can hardly arrive at any conclusion as to the channel of infection. In Borna disease infection was supposed to be spread mainly by food and water, especially water, and some workers favour the view that it is air-borne. In America contaminated pastures in certain localities have been charged with the production of the trouble. The outbreaks of the disease which Graham termed botulism were traced to the use of badly-cured forage or ensilage. In Scotland we have always believed the infection was spread by the grass, but the number of cases which one meets with in the spring, and which have never been on grass for six to eight months, causes one to wonder more as to the dissemination of the organism. During this month I have seen three cases in horses on house feeding; two were sub-acute, and are still alive, the other was acute, and all were typical cases. It would seem as if the virulence of the disease increases in June and July, and then gradually diminishes as the ratio of acute cases to subacute or chronic is higher during these months than later or earlier.

When we consider that this disease can affect animals living under conditions in the country similar, as far as feeding is concerned, to those of the city horse, it seems rather strange that we have not hitherto had any report of a serious mortality among town horses. Probably some here to-day can give us information on this point. Examination of the food of these animals affected under house-feeding conditions usually shows that it is of first-class quality, and surely if the food was infected with the *B. botulinus*, we would frequently find under stable conditions more than one animal affected; but in my experience it is rare to do so.

As I have mentioned, some observers on the continent have considered the disease air-borne, and point to the catarrhal condition of the turbinated bones and the congestion of the olfactory bulbs as indicating the point of attack. This feature, which is usually present as a *post-mortem* condition, does seem rather strange, but we must always remember that owing to disturbed nervous function the pharynx soon develops a catarrhal condition which might extend to the adjoining parts. At one time I considered the theory that the disease might be air-borne as absurd, while to-day I am not so sure that it is. At first grass disease was thought to be a disease of the prime of life in the horse (3 to 10 years), but we now know that it may affect any age from the foal at its dam to the ancient of 30 years of age. In my district I usually think that the most serious mortality is among the two-year-olds and three-year-olds. All breeds seem to be susceptible. As regards the period of incubation, we can say little until the causal organism is more clearly defined, but most observers consider it short—probably from twelve hours to a few days.

Clinical Symptoms.

Although, as a rule, after careful and repeated observation we are able to arrive at a fairly accurate diagnosis, we must recognise the difficulties of an early diagnosis, as the symptoms we note, although quite distinct in many ways, are not really pathognomic for grass disease, and might be regarded as the commencement of other and less serious ailments. Continued observation shows that there is a definite but usually elusive clinical picture produced by the primary intoxication, and might be termed the real grass disease. We do not often get an opportunity of seeing this stage, as the disturbance would not attract the attention of any but a very observant owner or attendant.

It is only when we have a number of cases on the same farm with a number of horses under observation that it is noticed certain animals look slightly indisposed; they are dull and stand about the fence side more than usual; they may be down a few times, then get up and wander through the field in a rather erratic fashion, picking occasionally at the grass. Examination shows an increased frequency of pulse, may be 60 per minute, with a temperature of 101°-102°F. After a day or two some of these animals appear to be quite normal, but others may show more pronounced symptoms, and rapidly pass into the acute and subacute types. Although we recognise clinically three forms of the trouble, these are merely arbitrary distinctions so far as we are concerned; the essential *post-mortem* lesions are characteristic of the disease.

In the usual clinical expressions of the disease there is to be observed a regular gradation of symptoms, varying from a few hours' visible illness in a very acute case to slow wasting, which may last months, in the chronic type. An acute case may last five or six days. I have heard it stated it is possible to find definite diagnostic evidence at the beginning of an attack of grass disease; this observation is opposed to my experience, and, I have reason to believe, to that of others conversant with the disease. Our diagnosis in the early stages frequently rests more on an intuitive apprehension than on any definite symptom.

Briefly stated, the earlier symptoms in an acute case when observed are salivation, dull expression, slight pain, sweating, rigors, and a more or less complete arrest of bowel function; the case at the beginning resembles a mild colic case, except for the great depression, which is sometimes very marked. The pulse and temperature may not be much altered at the beginning of an attack, but later the former becomes small and quick, resembling that of acute enteritis. As the case develops more tympany is noticed, and food is regurgitated from the stomach, escaping through the nostrils. Some authorities on the horse in the past have expressed the opinion that vomiting in the horse only took place after a rupture of the wall of the stomach. In an acute case of grass disease it is a regular feature near the end. At the same time the distress of the animal becomes more acute, and I think the increased pain and the vomiting are due to the paralysed stomach becoming over distended with fluids and the patent cardiac sphincter allowing the contents to escape freely up the œsophagus. The case may be characterised by recurring attacks of colicky pains, but the glassy eye, rigors, running down pulse and increasing tympany are symptoms directly pointing to approaching dissolution due to a deep intoxication arising from the alimentary canal as an inevitable result of perverted function. A feature is that in many cases the animal on the second day of illness may look quite well and be dead two days later.

Referring now to the subacute type of case, and also to that classified as chronic, we find that, like the acute, they may be ushered in by sharp colicky pains.

In the acute type the tendency is for the abdominal cavity to become more distended and tympanitic, whereas as the subacute case progresses the abdominal cavity steadily diminishes in volume, until about the end of the case we get a picture of extreme emaciation and wretchedness. What seems to distinguish between the acute and the subacute types is that in the former there is a complete and in the latter an incomplete loss of function in the alimentary canal. Usually a slight tremor of the muscles is to be observed —sometimes in the region of the shoulder, sometimes in the hind limb, and occasionally in both. On examination the region covered by the tail is found covered by a profuse perspiration, and other parts of the body patchy sweating is to be noted, especially about the region of the neck. Attention is directed to the respiratory tract by a snuffling nasal breathing with a slight discharge, which is usually mucoid to begin with, but may become blood-tinged later. These symptoms, muscular tremors and nasal sounds, suggest at first to one's client that his horse is suffering from a cold. The case usually has its good days and its bad ones; in the latter the tremors are worst, the nasal sounds louder, and the appetite practically disappears. Sometimes on the bad days there are frequent colicky pains, causing him to lie down. Almost invariably there is more or less difficulty in deglutition; in some cases the difficulty is observed to be distressing. After a time the mouth becomes dry and the tongue coated, the unfailing index of defective elimination; another result from this same cause is seen in the jaundiced condition of the sclerotic conjunctiva. These symptoms are dominated by the rapidly progressive emaciation, gradual loss of appetite, obstinate constipation, and by what seems a more and more rigorous insistence of the characteristic attitude of standing huddled in a corner with his tail to the wall.

If the animal lies down, it is not for long, and he soon resumes what really strikes one as being a characteristic meditative or drowsy attitude in the corner, easily roused by the slightest noise. Odd cases show some variation such as a loose floundering gait, signs of a considerable skin irritation, with, later, the shedding of a thick crust of epidermal scales.

In a few cases there is evidence of what looks like meningitis, as the animal moves about stiffly with the head slightly elevated, the nose poked out, and seems disinclined to eat from the ground. As the case proceeds there are frequent efforts at micturition, but the urine is passed in small quantities, and is of an oily appearance. A few days before death the pulse increases in frequency, but, contrary to what might be expected in the period immediately preceding death, it is abnormally slow. The animal goes down, no doubt from nervous exhaustion, and dies in about twenty-four hours. The duration of this type may be from one to six weeks.

The chronic type is merely a less aggravated form of the disease, with this difference, that the symptoms are modified, and after a period extending into months the animal very slowly improves. It may be six or nine months before he is fit for any labour, and even then the recovery may only be partial, owing to permanent interference with the nervous energy of such vital parts as the larynx, œsophagus, lungs and heart. Although he may become fat, he has not the necessary physical endurance for the work of the farm.

Post-Mortem.—The complete or incomplete stasis of the alimentary canal modifies the clinical picture, and in a similar way affects the *post-mortem* appearances. In the acute case where stasis has been complete we find very marked changes, especially in the stomach and bowels. There is found a distended stomach with a large area of gastritis, an impacted bowel with acute enteritis, and the other organs, such as spleen, liver, and kidneys, exhibit congestion. Frequently there is pneumonia which may be gangrenous, and this condition may extend to the trachea and œsophagus. In a subacute case the marked feature is the emptiness of the abdominal cavity and puckering of the bowels. There is very little to be seen which in itself could affect the animal seriously. In all the cases, especially those that are subacute, we find on opening the head congestion of the nasal mucous membrane and hæmorrhagic extravasation into the olfactory bulbs. It gives the impression that changes have taken place in that part.

Treatment.—The curative treatment of this disease is not promising. If cases could be recognised before serious secondary symptoms make their appearance, one hopes that an effort might some day be made to arrest the progress of the malady by large doses of a suitable serum. But once complete suspension of the digestive functions makes its appearance, we find a new disease superimposed on the original, and this soon terminates the case.

Hitherto with the chronic type of case dieting with laxative foods and attention to general hygiene have given better results than medicine. If the weather is good, the patients seem to do better outside. The discovery of a bacteriological product is the urgent requirement of the profession. With this end in view a considerable amount of work has been in progress. The exponents of the botulism theory have instituted an extensive experiment in Forfarshire in the immunisation of horses against botulism. This should protect the horses against botulism, but it remains to be seen if it will protect them against grass disease. Perhaps some gentlemen from Forfarshire will give any experiences they may have had with this anti-toxin. In support of the view that this disease is Borna disease, a considerable amount of work is in progress, but no definite results can be announced yet.

Discussion.

Mr. Inglis: By way of opening the discussion, I should like to say that I thank Mr. Nairn, my neighbour, for bringing this subject to the proper place for discussion. Hitherto, with the one exception of Professor Gaiger, in Glasgow, this important subject has always been discussed at agricultural meetings. Investigations have been going on for a number of years. We have had the disease in Forfarshire, and I, along with others, have been fighting it for the last 11 or 12 years. The Angus Agricultural Association asked me to get an authority and try to get to the bottom of it. I asked Principal Dewar, and he came up, and we did everything possible to find some reason for its appearance. At that time the grasses were suspected. They may have something to do with it in conveying the disease; but, as you all know, our old friend Principal Dewar died, and then the Angus Association referred it to the Highland Society to institute and form a committee to carry on the investigations. The disease, as I say, has been very troublesome to all practitioners in the districts where it broke out. In Forfarshire it began on the coast, and in my experience it always was found on a highly-cultivated farm. We never got it on a croft or on a small farm. It gradually came inland and spread from farm to farm. If you got it breaking out on one farm, in a few days or weeks you were always certain to get it on a neighbouring farm. We have a very large number of horses now said to be protected with the botulinus serum—some 500 or 600 horses. These will be a fair test as to whether it is a protection against grass disease or otherwise. The disease has altered considerably since I remember it first. At first it used to yield a little to treatment. That put us off our guard. We thought we were always dealing with an ordinary case of mechanical impaction. Latterly nothing could be said that was of any value in the way of treatment. Some claim to have treated cases, and some claim to have cured them. There is no cure up to the present moment. I do not think I have anything else to add, further than this, that up to the present this season we have only had three cases, and they are amongst horses that have not been injected. We have had no injected horses up to the present moment that have taken the disease. Whether that is a coincidence or not I do not know.

Mr. Spruell: I would like to thank Mr. Nairn for his excellent paper on grass disease. He, like other unfortunate Forfar and Perthshire veterinary surgeons, has had a very rough time with it for some years. There is one point in diagnosis which I think

Mr. Nairn did not mention, and that is the question of rectal examination, and I think that for anyone who is in a grass disease district that is invaluable. I do not think there is any ordinary impaction that gives one the same feel on rectal examination—the absolute cementing of the bowel contents in the colon and cæcum. I am speaking of acute cases more particularly. It is just as if a few sacks of cement had been damped and solidified. You can hardly pit it with the finger. This impaction gives rise to attempts at micturition, due to pressure on the bladder. Another symptom which I think is almost always present—certainly always present in chronic cases—is a soapy sweat immediately below the tail. You find a sweat in ordinary colic cases, but this is quite distinctive. Personally, I think there is a distinct odour, but I cannot put a name to it. It is just by practice and by having seen cases that one knows it. Another symptom which is a useful means of identification for those not accustomed to the disease is to take a suspect out to the water trough. He may or may not drink, but if he does drink you find that he is making involuntary movements in drinking, and very little of the water is getting away, and he has got to dive his nose well down before he can carry it away at all, due to paralysis. Another symptom is ptosis—the half-shut appearance of the eye; and if you wake him up and make a noise, then he opens his eyes quite completely. Occasionally you have paralysis of one of his lips, but that is not always present. I think the difficulty in drinking is always present, and in acute cases impaction of the bowels, and certainly the soapiness under the tail, flanks, and behind the shoulder. Another symptom is that very often he gets a ewe-necked appearance; there is retching and squealing, regurgitation of food and vomiting down the nostrils. Mr. Inglis spoke about the disease being always found on highly-cultivated ground. The first cases that appeared I think were back in 1906, 1907, or 1908, and they were down towards Budden and Barry. These horses had been grazed on old policy parks at Panmure. At that time we had eight or ten or twelve deaths. My father and I at that time thought it was probably some vegetable poisoning, and Professor Stewart Macdougall thought it might be due to a little plant very prevalent in those parts, *Potentilla tormentilla*. We tried feeding experiments with tormentil, but with no results; the horses did well. We saw Major Lane, who had horses at Budden, and he put some at our disposal. We gathered tormentil and fed them on it, but they did well. That was a very old pasture, and could hardly be called highly cultivated. From that date the disease swept both east and west, gradually advancing till it was outside Dundee, really travelling north-west and right up to Strathmore and on by Coupar Angus. So far this year we are giving this antitoxin a trial in my neighbourhood. Mr. Ferguson, Mr. Gibson and I—and I think Mr. Inglis also—have all a big number of horses treated. Up to date there has only been one case of grass disease, which occurred two days after the first injection which I made. That may have been due to the serum, or was probably a coincidence. There was a typical case at Inverperth. It was treated with antitoxin alone, but died five or six days afterwards. No serum could ever have opened his bowels or brought him back to normal, because the whole contents were adherent and like cement. In conclusion, I just wish to thank Mr. Nairn for his paper. (Applause.)

The PRESIDENT: Perhaps Professor Gaiger would give us a few remarks.

Professor GAIGER: I really did not come to say anything this afternoon, but to hear the practitioner's point of view on the disease. I would like to say a word of thanks, and merely ask a question about gangrenous pneumonia, which Mr. Nairn says he sometimes finds. Does he attach much importance to that, or does he not think it may be a secondary condition due to difficulty in swallowing?

Mr. NAIRN: Yes, you do not always find it,

Mr. PEGGIE: I would like to thank Mr. Nairn for being so kind as to come here and give us a paper. It is a very interesting subject, and is becoming more so to practitioners. At first it was more or less confined to northern counties, but two years ago in the upper part of Lanarkshire I came up against a case. Not knowing anything about grass disease, the case looked to me like one of choking. The man told me when he took the horse out for a drink he noticed the animal could not drink. I treated him, but he became worse and developed the disease known now as grass disease. The previous year we had another case in Peeblesshire, with the same symptoms and the same fatal result. It is imperative for us all to be on our guard, because the disease is spreading, not only in the north of Scotland, but all over the country.

Professor GREIG: I wish to thank Mr. Nairn for his most interesting, and so far as I am concerned, most instructive paper. I am afraid I cannot contribute materially to the discussion to-day, as I have had no experience of grass disease, nor have I seen a case of "Borna sickness," with which Professor Gaiger has identified grass disease. When one compares the published records of the two diseases, one is bound to recognise a great similarity in the clinical symptoms, but there are two factors which make it difficult for me to altogether associate them. I am speaking as one who has seen neither of these diseases, and perhaps Professor Gaiger, whom we are pleased to see to-day, may be able to clear up my difficulties. My first difficulty is that the records of Borna disease all seem to show that the symptom of cerebral excitement is present in practically all cases; at least, great stress is put upon that symptom. In the so-called "forage poisoning," which is recognised as being closely similar to, if not identical with, Borna disease, and with which I have had experience on the continent, cerebral excitement is a marked feature. On the other hand, so far as I know, and so far as I heard from the paper to-day, cerebral excitement is not a marked symptom of grass disease. My second difficulty arises from the extraordinary condition of impaction met with in grass disease. Descriptions of the condition with

which I have been furnished coincide with that given to-day by Mr. Spruell, who said that the contents of the large bowel resembled hardened cement. Impaction is not recognised as a feature of Borna disease; in support of that statement I may mention that Dr. Mohler advises as a preliminary to treatment the "clearing out of the bowels" and for that purpose recommends the subcutaneous injection of half-a-grain of arecoline hydrobromide. Would half-a-grain of arecoline be of any use against the impaction of grass disease? I would be glad to have any information upon these points, especially from Professor Gaiger, who, I know, has had a large experience of Borna disease.

Professor GAIGER: The question has been put to me, but really I think Mr. Nairn would be more competent to answer the first point, which is more a clinical one. Cerebral excitement is one of the symptoms in grass disease in this country. Am I not right?

Mr. NAIRN: Yes.

Professor GAIGER: Very much so in some cases. It is stated in most of the books that there is no treatment for Borna disease. If arecoline hydrobromide will so easily clear out the bowel, why is it not a recognised treatment? If it is a specific, it would be largely used, but where Borna disease occurs it is recognised there is no treatment for it, just as much as it is recognised that there is no treatment for grass disease in this country. I have no doubt myself that the two diseases are identical. Long before going to any bacteriological results, I came to the conclusion that it was Borna disease from a study of Borna disease alongside a study of grass disease. Having made up my mind, I set to a bacteriological investigation of the disease, and was astonished to find what the workers in the Argentine found, streptococcus in the brain. Being very specialised, you are up against a great difficulty in cultivating it originally from the body in primary culture. Secondary cultures are quite easy. I have still this organism in pure culture. It is highly pathogenic. Last week it killed a rabbit in 12 hours. The intravenous method is the quickest way in which it kills. I should be sorry to say that is the cause of the disease, because one wants a great many more cases, and one wants to see that cases can be reproduced. Before you can do that you want an animal that is known to be susceptible, of proper age, and complying with other requirements. Up to the present we have tried it on two old horses and a young Shetland pony, and it was not pathogenic on any of the three. We have had such a heavy infection of the brain that you could see the organism in sections. You must attach some importance to an organism found in the brain of a sick animal and possessing pathogenic properties. To me it was an interesting fact that the work we did in Glasgow corresponded so exactly with the work done in another continent altogether. It is also interesting in helping us to confirm this disease with Borna disease, because until you can give a disease a name it means very little. Having named the disease Borna disease, it sets people reading about Borna disease, and they discover that grass disease covers the whole of the east coast from Inverness to the middle of England. If the work in Glasgow did nothing else, it gave the disease a name, which enables others to recognise it. It is difficult in reading forage disease to associate that disease with grass disease or Borna disease. No doubt there are certain cases in America that are called forage poisoning which are really Borna disease, real grass disease. There is in America Dr. Graham, who is working on the botulism theory. When you read his work you find there is only one animal from which he got his results, and that was an experimentally-fed horse. So you have to discount a great deal of what you see in headlines in regard to the two being associated. Other workers in America have repeated his work with no results whatever. One has come to the conclusion that there are no organisms present in any tissue or fluid in the body. That is quite understandable when you think of the difficulty of which I have told you—the difficulty of growing and isolating the organism found in the brain. The work is very expensive, because you must have experimental horses and small experimental animals, and it is that that has rather set a limit to continuing the work we were doing in Glasgow last year. (Applause.)

The PRESIDENT: I thank Mr. Nairn very much for his paper on a very interesting and important subject. I did not just gather at what time of the year the incidence occurred. In practice in an American city we had a great many horses that died from what we called meningitis, but it was possible it was forage disease. The brain symptoms were exceedingly well marked. In every case the horses were in a galloping state. They seemed to gallop lying on their sides until death. I have never seen this disease in this country, and I wondered if this cerebral symptom was marked in the cases that are seen here. If there are no other remarks, I shall ask Mr. Nairn to reply.

THE REPLY.

Mr. NAIRN: You have received my remarks so kindly that I hardly think I need say much in reply. I shall, however, refer to a few points raised by various speakers. Mr. Inglis emphasised the point that he had mainly seen cases on grass grown on highly-cultivated land. I get as many cases on poor hillside rocks and heather as on rich pasture. The pasture, as I pointed out years ago, in itself could have nothing to do with the production of the disease. Mr. Spruell referred to my omitting the symptom of ptosis. I mentioned the drowsy appearance of the animal, and also the soapy sweat. That is a characteristic feature of the subacute case. I mentioned that also—that it produced perspiration. It is a striking point in sub-acute cases of grass disease to lift the tail and find the condition in which it is. I think a great deal of that soapy sweating is due to the way the animal keeps the tail pulled in tight over the anus, and of course it is associated with patchy sweating, it being exaggerated in that part. Mr.

Spruell also mentioned the importance of rectal examination to recognise the impaction of the bowel. There is no doubt it is quite important, but I have seen cases of grass disease where you had the bowels moving on the first day quite freely, and afterwards they became packed. So in cases of that kind it would not be a guide, and you soon get tired of such examination. Then you have the symptom due to the condition of the œsophagus, but that mostly makes its appearance in the later acute cases. You do not get it in the very beginning of the acute cases.

Mr. SPRUELL: Yes, you do.

Mr. NAIRN: I have never seen it in the first day or two. Of course, we often have cases of grass disease that have been unnoticed by the owners for days before we are called. The symptom of cerebral excitement mentioned by Professor Greig has been dealt with by Professor Gaiger. There are cases that show that symptom. In a number of cases the drowsy condition is noticeable. With the drowsiest animal it is remarkable how easily he is roused up. The slightest noise makes him look up. In sub-acute cases you have also the wandering about, treading up and down the fence side, eating a bite occasionally, and wandering on as if they could not get rest. Professor Greig also referred to the injection of arecoline used in Borna disease. If it is successful in such a case, then Borna disease is not grass disease. The President referred to the period in the year of greatest incidence of this disease. I mentioned in the paper—perhaps not clearly—June, July, and August as the months in which we get most cases, but we may get cases at almost any period of the year.

Mr. INGLIS: Before leaving the subject, I may be a little irregular, but I might say that the practitioners of Forfarshire will be very pleased to show any students round their cases if they desire to see them. It might be of some value to them in after life. (Applause.)

Pulmonary Ascariasis.

By A. W. NOEL PILLERS, Liverpool.

On looking through our periodicals for the last six or seven years for another purpose I was struck with the scant references to the work of Stewart and others with regard to the life cycle of *Ascaris*, and its possible bearing on the clinical aspects of infestations with worms of this and allied genera in the different domestic animals. Stewart showed that when the eggs of the human ascaris were fed to mice the larval forms migrated from the alimentary canal to the lungs and, having ascended the trachea, were then swallowed and finally passed out with the fæces. These facts led him to believe that mice were the intermediate hosts of the ascaris of man and swine. Ransom and Foster later on proved that this conclusion was not well founded, but that Stewart had really established the fact that ascaris eggs do not develop directly in the intestine without leaving it as was at one time believed. The mouse was thus an unsuitable host so far as the final stages were concerned. From the work of these three authorities, together with that of Cram, it is now known that the eggs voided in the fæces are swallowed; they then hatch, the larval forms enter the intestinal wall, and, passing into the portal circulation—liver, and heart—at length arrive in the lungs. Here, in passing from the capillaries to the alveoli they cause small hæmorrhages, and if the infestation is severe bacterial invasion and pneumonia may result.

In America, where swine occupy an important place in the practitioner's activities, frequent references to the disease are made in the journals. In *Veterinary Medicine* for March this year (Vol. XVII., p. 129), Hall gave a full account of the condition. He states that many cases of thumps (rapid spasmodic breathing) in young pigs are due to it. In older animals a similar clinical picture may be due to other causes—swine fever—and dietetic errors. Kingsley (p. 174 of the same journal) points out that the losses, either in deaths or stunted growth in the States are enormous, and recommends oil of chenopodium as a satisfactory drug, providing due attention is paid to fasting, and its irritant properties. He also mentions santonin.

The ova of ascaris have been shown to be capable of living in 3 to 5 per cent. solutions of formalin for months, and they are not easily destroyed by any of the common disinfectants. Cleanliness of animals and their surroundings is therefore essential in prevention. Swine are not the only animals affected with ascarids, and what happens with them might easily apply to others. Providing the necessary food or a suitable substitute for it can be found in an abnormal situation, there may not now be so much difficulty in explaining how ascarids arrived there.

R.C.V.S. Annual Meeting.

In our report of the annual meeting of the Royal College, given in last week's *Record*, the name of Sir Stewart Stockman was mistakenly omitted from the list of those present, and that of Sir Layton Blenkinsop was not included amongst those declared to be elected members of Council, although given in its proper place in the report of the scrutineers.

B.M.A.'s Glasgow Meeting.

The annual general meeting of the British Medical Association will be held in Glasgow next month, under the presidency of Sir William Macewen. A number of very interesting papers and discussions are promised.

Not the least of these will be that of Professor Fibiger, of Copenhagen, on his experiments with the small worms which he found to be capable of producing cancer in rats, and which pass a portion of their life-cycle in the cockroach. Professor Fibiger's work is of vast interest and his paper will be eagerly awaited.

Another interesting contribution is likely to be that of Dr. Mervyn Gordon on the bacteriology of influenza—one of the most hotly contested fields of modern medicine. At present several different germs are supported for the distinction of being the cause of this infection. The section of microbiology will also listen to papers dealing with relationships between animal and plant diseases,

while Dr. St. John Brooks will discuss "Cultures of Organisms Pathogenic for Man, Animals and Plants," and Professor David Ellis, "Iron Bacteria; Sulphur Bacteria; Fossil Iron Moulds."

Important papers will be read in the section of neurology and psychological medicine. In the Public Health Section, Dr. Brownlee, Statistician to the Medical Research Council at its central institute in London, whose earlier work in Glasgow is well known, will lecture on "Statistics." As Dr. Brownlee has opened up new avenues of use for the statistical method in medicine, his contribution may be expected to arouse great interest. The public health section this year is specially important. So is that of diseases of children. Here the rickets controversy will be reopened in that home of rickets, Glasgow. Dr. Leonard Finlay, Professor Mellanoy and other protagonists will take part. Sir William Willcox, whose expert evidence in recent important trials has been so eagerly read, will contribute to the section of "Industrial Diseases and Forensic Medicine," a paper on "Dangers to health arising from use of preparations of arsenic in various industries."

A cinematograph demonstration will be given by Professor Rollier, of Leysin, illustrating "The share of the sun in the treatment and prevention of tuberculosis," which he has done so much to bring to public notice. The Erlangen methods of treating cancer by X-rays of very high penetrating powers will be discussed in the section of Radiology and Electrology.—*The Times.*

London Cart Horses.

The horseless age seems as far off as ever—in fact, if the London Cart Horse Parade is any criterion, the use of heavy horses for town work shows a very healthy increase. Whereas 746 horses were shown in 1921, the number on view on Whit-Monday was 1,081. Undoubtedly the principal reason for this increase is that town contractors, borough councils, etc., have found, by experience, that the horse is more economical than mechanical transport for short-distance work; whilst the fall in values and the comparatively low prices for feeding-stuffs have also helped in the revival of the heavy dray horse. There is no doubt that its popularity could be further advanced if breeders would cater for the town trade and pay more attention to the feet and legs of their horses. For, after all, hard-wearing limbs are the most important characteristic of an animal which is called upon to shift heavy loads over the modern roads with surfaces put down mainly for motor traffic. There is a growing tendency to regard such events as that held every year in London on Whit-Monday as mere horse parades, whereas their chief object is to encourage the use of powerful cart horses suitable for heavy work. The indiscriminate awarding of prizes to anyone and everyone whose horses are well kept and groomed is doubtless the main reason why so many inferior animals are shown; and it would tend to stimulate the heavy horse trade if the regulations at cart horse parades were so tightened that those animals which came within the category of vanners should not be entered. In the case of London, a special parade for light horses is held every Easter, when vanners are catered for. Generally speaking, the quality of our town heavies does not show such steady improvement as one might reasonably expect in these times of more advanced knowledge in breeding. For example, the great majority of the horses are markedly deficient in bone and not at all suited to drawing heavy loads—a remark applicable to the Shire, Suffolk and Percheron. The Shire still occupies the front rank in popularity; but the disparity in type is most marked, and though more good, substantial geldings will now be available, owing to the heavy horse stallion restrictions, breeders should study more carefully the town owner's requirements. In the matter of extending the demand for Suffolk horses, much spade work is necessary, and the Society should take steps to popularise the breed in the large towns outside East Anglia. Prices at recent sales have shown that there is a demand for the Punch; but a good representative sale, in London, for instance, would be a speculation well worth risking.—*Farmers' Gazette.*

Warble Fly Damage to Cattle Skins.

A Committee of the Ministry of Agriculture has for some time past been considering scientifically the various remedies which have been suggested for checking the damage to skins of cattle made by the warble fly pest.

In the past the step most favoured in dealing with the pest has been the squeezing out of the maggots from the backs of cattle during the season when they become "ripe," *i.e.*, from February to June. This method, however, although efficacious if persisted in, entails much labour. The Committee therefore directed their attention to observation of the action of washes or smears which can readily be applied to the backs of cattle.

They found that one particular dressing, a wash prepared from a tobacco powder mixed with lime, was very effective, and they are recommending its use in the present season. It is made up as follows:—In a gallon of water is dissolved one pound of fresh lime. To this four pounds of tobacco powder are added and the mixture left standing for 24 hours. The liquid is then strained through coarse muslin or sacking and applied to the backs of infected cattle with a cloth or brush. To obtain the maximum amount of liquid, the muslin cloth or sacking through which the mixture is strained should be wrung out, and, if necessary, additional water introduced for a second wringing if that can be done without unduly weakening the resulting wash.

The quantity mentioned is enough for dressing the backs of a dozen beasts. It is important that the application be carried out so that the liquid penetrates through the breathing hole into the cavity of the warble and comes into contact with the maggot. If the dressing is applied at intervals of two or three weeks up till the end of June, it may confidently be expected that most of the maggots will be destroyed.

During last spring an experimental dressing of no fewer than 940 cattle was made with this mixture under the direction of the Irish Department of Agriculture. Of 4,885 warble maggots found to be present in the cattle, 3,990 were destroyed, representing a mortality of over 80 per cent.

The Committee have suggested that this remedy should be tried by farmers during the present season on as large a scale as possible, and the results communicated to the Ministry. The number of maggots present and destroyed, the apparent effect of single applications and repeated applications of the wash, and any other particulars of interest might very usefully be sent to the Ministry. The Committee have not yet made their final report, but they will do so at the end of the present period, after a consideration of the various reports which it is hoped farmers and stock owners will send in as to the value of the wash described. The recommendations may be expected to cover the question of legislation to secure the general adoption of remedial measures against the warble fly pest.

The Veterinary Record.

24th June, 1922.

National Veterinary Medical Association of Great Britain and Ireland, Limited.

FORTIETH ANNUAL GENERAL MEETING.

BATH, AUGUST 1ST—4TH, 1922.

Guildhall, Bath.

PROVISIONAL PROGRAMME.

TUESDAY, AUGUST 1ST.

3-0 p.m.	Committee Meetings.
4-0 p.m.	Council Meeting.
8-0 p.m.	Reception, Grand Pump Room (musical programme; light refreshments). Visit to Roman Baths.

WEDNESDAY, AUGUST 2ND.

9-15 a.m.	Annual General Meeting. Presidential Address. Civic welcome to the City of Bath by his Worship the Mayor, E. J. White, Esq.
11-15 a.m.	"Bovine Mastitis," by F. T. Harvey, F.R.C.V.S., St. Columb. Discussion opened by H. Begg, F.R.C.V.S.
2-0 p.m. to 6-30 p.m.	Surgical and other demonstrations.
2-0 p.m.	(For ladies). Motor Coach Drive to "Longleat," by invitation of the Marquis of Bath
8-0 p.m.	Whist Drive at the Concert Room, adjoining Grand Pump Room.

THURSDAY, AUGUST 3RD.

9-15 a.m.	Lantern Lecture, "Hygienic Construction of Cowsheds," by Prof. A. Linton, M.R.C.V.S.
10-30 a.m.	"Hernia," by Prof. E. Brayley Reynolds, O.B.E., M.R.C.V.S. Discussion opened by Major F. T. J. Hobday, C.M.G., F.R.C.V.S., F.R.S.E.
11-30 a.m.	Discussion relative to demonstrations of previous day.
2-0 p.m.	"The Veterinary Profession and a Pure Milk Supply," by Sidney Villar, F.R.C.V.S. Discussion opened by Lt.-Col. J. W. Brittlebank, C.M.G., F.R.C.V.S.
3-0 p.m.	"The Treatment and Prevention of Canker in the Horse's Foot," by A. W. Noel Pillers, F.R.C.V.S. Discussion opened by W. R. Davis, M.R.C.V.S.
4-0 p.m.	Closing Meeting.
4-30 p.m.	Garden Party, at the Institution Gardens, by invitation of the members of the Mid-West and South Wales and Western Counties Veterinary Medical Associations.
7-30 p.m.	Annual Banquet (Grand Pump Room Hotel).

FRIDAY, AUGUST 4TH.

9-30 a.m.	Visit to Bathing Establishments.
10-30 a.m.	Motor Tour to Historical Caves at Cheddar, Glastonbury Abbey, and Wells Cathedral.
8-0 p.m.	Dance and Concert.

Association Reports.

Victoria Veterinary Benevolent Fund.

ANNUAL MEETING.

The Annual General Meeting of this Association was held at 10 Red Lion Square, immediately following the Annual Meeting of the Royal College of Veterinary Surgeons, on June 6th.

There were present:—Mr. S. H. Slocock, in the chair; Messrs. A. Gofton, F. L. Gooch, B. Gorton, P. J. L. Kelland, Sir John Moore, Messrs. T. S. Price and E. A. West.

Apologies for absence were received from Major-General Sir Layton Blenkinsop, Mr. Banham, and Colonel Brittlebank.

The SECRETARY read the notice convening the meeting.

Minutes.—The minutes of the previous Annual General Meeting, held at Edinburgh on June 6th, 1921, were read and confirmed.

Election of President.—On the motion of Mr. WEST, seconded by Mr. PRICE, it was unanimously resolved that Mr. S. H. Slocock be re-elected President for the ensuing year.

Mr. S. H. SLOCOCK: I must accept the office to which you have so kindly elected me. I cannot do otherwise, but I should like to see some more energetic man take the Presidency. As it is your good will that I should be elected, it will be my best wish to serve the aims of the Fund as well as it is possible.

Election of Vice-Presidents.—The PRESIDENT: I think it is my privilege to propose the re-election of four Vice-Presidents: Major Inglis, Sir Stewart Stockman, Mr. Price and Mr. West, and I do so with much pleasure.

Sir JOHN MOORE: It is a good plan, in my opinion, that in a business of this kind there should be some continuity of policy, and I therefore second the proposition. Carried unanimously.

Hon. Secretary and Treasurer.—The PRESIDENT: I have much pleasure in proposing the re-election of Mr. P. J. L. Kelland as our Hon. Secretary and Treasurer. He has been associated with this office for many years now, and I know he has everything at his finger ends. He is also located near to the headquarters, so that it is very convenient.

Mr. WEST: I have much pleasure in seconding that motion. Carried unanimously.

Auditors.—Messrs. Woodhouse and Wilkinson were re-elected auditors of the Fund for the ensuing year.

Annual Report and Balance Sheet.

The PRESIDENT: We will now take the Annual Report, which has been circulated to all members. Following our usual custom, we will take it as read and pass it paragraph by paragraph. I would like especially to call attention to the very large contribution to the Fund made by the Boltons Cinema—namely, £107 2s. 0d. This, as you know, comes to us through the instrumentality of Mr. West, and I should like to express to him our gratitude for his assistance in this respect.

Mr. GOOCH: I think we ought to accord our appreciation of what Mr. West does for the Fund in this way, and I have much pleasure in seconding. Carried with acclamation.

Mr. WEST: It is a great pleasure to me to do what I can for the Fund. Of course we never know what may happen, but I hope we may be able to continue the amount.

The PRESIDENT: We will now pass to the rest of the report. You will notice the reference to collecting boxes. These can be supplied to any member who is willing to use them for collecting for the Fund.

With regard to the Veterinary Associations, we are particularly glad to have their assistance. Most of the Associations now subscribe at least £2 2s. 0d. a year to the Fund, and appoint their own representatives on the Council.

The rest of the Report gives the statement of work done and the Balance Sheet shows the state of the funds at the present time.

Mr. WEST: I have here a few notes on the Balance Sheet of the Fuud, which may be of interest to those who have not had time to read it carefully through.

The yearly income of the Fund for 1921 as derived from subscriptions, dividends, and income tax recovery was £1,128 12s. 11d., and the amount paid for relief to 33 annuitants was £940 2s. 2d.

The administration expenses and the subscriptions to the London Orphan School and the Charity Organisation Society amount to £106 9s. 6d.

There is, therefore, a balance of income over expenditure of £82 1s. 3d.

The object of reviewing these figures is to remind us all that we are sailing very close to the wind on the present income.

It would of course be impossible for us to increase the amount which we give the present annuitants to any extent, nor could we help many fresh applicants. It is, however, comforting to know that the capital account is becoming annually increased by the donations, so that if we had no increase in the number of annuitants, we should in a year or so have a bigger margin of income over expenditure. I should also like to draw attention to the investments of the General Fund, *i.e.*, as distinct from the Clement Stephenson Fund. The total amount of these investments at cost is £5,090, and this sum produces only 3 per cent., because, of course, it was invested at a time when such rate of interest was considered pretty good. If these stocks could be sold out without loss, and the money invested in equally good securities, so that the stock earned 5 per cent. instead of 3 per cent., our income from this source would be £255 per annum instead of £171. I do not, however, know whether these investments could be realised without loss. I merely thought that if these figures were presented to you in a somewhat different form, they might be interesting, and can only say that the Balance Sheet, to my mind, is a highly satisfactory one, showing evidences of great care and attention on the part of our very efficient Secretary.

The SECRETARY: I fear the stocks mentioned by Mr. West cannot be disposed of now without loss. They were bought a long time ago and their value has depreciated.

Mr. WEST: I feel we must do everything we can to increase our income, so that we may be able to get better assistance to our annuitants. I feel sure that if the profession knew the details of our cases, we should have an increase of the number of subscriptions received.

Mr. KELLAND: I quite agree with Mr. West. I am quite sure that if we were more generous with our grants, and we had to call upon the profession for greater assistance, the money would be handsomely met.

Mr. GOOCH: I think it should be said that we go thoroughly into every case. We know all their incomes and the particulars about their children, and whether they are able to help. We give what we think is a right grant. I propose that the Annual Report and Balance Sheet be received and adopted.

Mr. PRICE: I second that. Carried unanimously.

Election of Members of Council.—The PRESIDENT: We now come to the election of ten members of Council to represent the members of the Associations.

Mr. WEST: With your permission, Mr. President, I should like to propose the following names:—

Sir Layton Blenkinsop, Mr. Gooch, Mr. Trigger, Professor Gaiger, Mr. Spicer, Mr. Jackson Young, Mr. Garnett, Mr. Sumner, Mr. Roots, Mr. Locke.

Mr. GOOCH seconded, and the motion, on being put to the meeting, was carried unanimously.

A vote of thanks was passed to the President for his conduct of the meeting and the proceedings terminated.

Abstracts and Reviews.

Human and Animal Tuberculosis.

RÔLE OF THE THREE TYPES OF TUBERCLE BACILLI.

The Lancet, of May 20th, reproduces a lecture on this subject delivered at the Royal Institute of Public Health in February, by Dr. Louis Cobbett, Lecturer in Pathology at Cambridge University. The author says:—

"The advance of morbid anatomy in the early half of the nineteenth century—especially the work of Bayle and Laennec in laying bare the structure of tubercles—revealed the identity of the morbid process in men and animals, and laid the foundation of the doctrine of the unity of tuberculosis. It was therefore natural for Koch, when he discovered the tubercle bacillus, to conclude that there was but one kind of bacillus for all varieties of tuberculosis, both in men and animals. Soon after Koch's publication appeared in 1882 the avian tubercle bacillus was shown by Nocard and Roux in France, and Maffucci and Rivolta in Italy, to be a distinct type. Koch himself readily recognised the new discovery, but some time elapsed before it was accepted generally.

While the avian type of tubercle bacillus attained recognition quite early, many years were to elapse before

the existence of two types of mammalian tubercle bacilli was even suspected. It was odd that Koch, in spite of the comprehensiveness of his researches, failed to detect the differences, both in cultural characters and in comparative virulence for certain animals, which differentiate the human from the bovine type of tubercle bacilli. For he worked largely with rabbits; and already, 14 years earlier, Villemin* had detected the difference in virulence for this species of material taken from human and bovine sources. Klein† also, before the publication of Koch's full paper in 1884, had called attention to the same facts. But no notice was taken of this at the time, and not until the dawn of the present century did American observers, led by Theobald Smith, cautiously approach such a distinction.

Distribution of the Three Types.

At this moment Koch astonished the world by his announcement in London in 1901 that human tuberculosis differs from bovine and cannot be transmitted to cattle; and that bovine tuberculosis is not transmitted to man, or is at most so seldom transmitted that it can be safely ignored.‡ From the extensive and official investigations which were immediately commenced, as the result of this announcement, in England, America, and Germany, the three types of tubercle bacilli have emerged. They are known, respectively, as the human, the bovine, and the avian, but their distribution among the various species of animals is not so simple as their names imply, for the human type is not confined to man or even to mammals, nor the avian type to birds, while the bovine type occurs in a large variety of animals, not excepting man himself.

The subject of this lecture is the rôle of the three types of tubercle bacilli in human and animal tuberculosis, but the question of the reality of the distinction between the types, and their stability, must also be discussed; for without clear ideas on these points conclusions cannot be drawn from the types found in various patients. I can, however, only touch very briefly on these topics, and I shall have to dismiss the avian bacillus with very few words, since it scarcely touches on the domain of human pathology.

Sharpness of Distinction Between the Types.

For the purpose of differentiating the types, the differences of size and structure, which in bacteriology we rather grandiloquently style "morphological," are of no value whatever. Cultural characters and comparative virulence for certain test animals are alone of importance. The cultural character which distinguishes the human from the bovine type is greater luxuriance of growth on all culture media, especially on those which contain glycerine. The human type, consequently, is said to be eugonic, the bovine dysgonic; the human type, moreover, develops a yellowish colour on certain samples of ox serum. In attempting to estimate the luxuriance of growth of a given strain allowance must be made for its adaptation to conditions of growth on artificial culture media. All tubercle bacilli grow sparsely at first when taken from the animal body; in successive subcultivations they slowly and steadily improve in capacity for growth. The capacity for growth of a given strain cannot therefore be correctly estimated until it has been kept for some months under observation and grown on a variety of media. Moreover, different strains of any one type seem to differ somewhat in their innate capacity of growth, so that the more vigorous bovine strains approximate to the less vigorous strains of human type; there is thus a tendency toward the production of a continuous series, bridging the interval between the most eugonic and the most dysgonic strains. There is, however, I believe, no true overlapping of types in this respect, but, on the contrary, a distinct gap between them. Nevertheless, the correct classification of types by their cultural characters is not entirely without difficulty, and calls for patience and experience.

The test for specific virulence is usually limited at the present day to inoculation of the rabbit. Calves, necessary at one time to establish the existence of the types, are no longer indispensable, and are too costly for ordinary use. The goat is a very convenient substitute, but the rabbit will prove sufficient if attention is paid to the variability of its power of resisting infection with tubercle bacilli of human type. Though the rabbit, in general, is refractory to infection with this type of bacillus, in a good many individuals some amount of chronic tuberculosis may be set up by it in lungs and kidneys; in exceptional instances the lesions may be so considerable that inexperienced observers may, I think, be deceived into the belief that they are dealing with a bacillus of bovine type. Very occasionally an exceptionally susceptible rabbit may develop a progressive and fatal tuberculosis as the result of an injection of tubercle bacilli of human type; I have twice seen this occur. When it does happen it may be very misleading; but the true nature of the case will be indicated by the fate of other rabbits, if any have been inoculated with the same virus, and conclusive proof may be obtained if the virus be passed on from the fatal case to another rabbit, and minimal lesions, or none at all, develop in this animal. On account of this occasional failure in the resisting power of rabbits to infection with tubercle bacilli of human type it is desirable that two or more individuals should be inoculated on each occasion.

In the foregoing I may, perhaps, have given the impression that the determination of type of tubercle bacilli is so difficult as to be a matter of uncertainty and that the literature of the subject is strewn with errors of this kind. If so I have made too much of the difficulties; the latter exist, but patience and experience are quite able to overcome them in the ordinary case. These difficulties are, of course, increased in dealing with abnormal strains, which either possess the limited virulence of the human type without its luxuriance of growth, or are endowed with the virulence of the bovine type, but grow more copiously. Fortunately, such strains are only met with very rarely.

The Problem of Intermediate Mammalian Strains.

Dysgonic strains of lower virulence than the standard virulence of the bovine type, such as we have just spoken of, might, at first sight, appear to stand midway between the two mammalian types. But this is not the case; their virulence is not really like that of the human type,

* In the account of his researches published in 1868 Villemin writes: "At first we were inclined to regard this difference as fortuitous, but subsequent experience led us to conclude that the tubercle of the bovine race inoculated into rabbits possesses a much greater activity than that obtained from man." Études sur la Tuberculose, p. 588.

† Thirteenth Rep. Loc. Gov. Bd., 1883, p. 177.

‡ Trans. Brit. Congr. on Tuberculosis, 1901, Vol. I., p. 20.

though it may be so low for the rabbit that it approximates to that of the human type for this animal; for the guinea-pig and monkey it is depressed also. There is, therefore, none of that discrimination between the rabbit and the guinea-pig which is so characteristic of the human type, but rather an equality of virulence for these two animals which, though lower than that of the bovine type, is thus shown to be of the same quality. Such strains, then, reveal themselves as being attenuated strains of bovine type, and stand in no true sense intermediate between the types.

A good many strains of tubercle bacilli as eugonic as the human type, and yet virulent for calves and rabbits like the bovine type, have been raised in culture. But many of these strains have been shown by passage experiments to be mixtures of the two standard types; and typical human and bovine strains have even been isolated from some by cultivation from single colonies. These eugonic-virulent* strains, therefore, have been proved to be mixtures, and very probably all really eugonic strains virulent for calf and rabbit are of this kind. We cannot, therefore, admit either these eugonic virulent strains or the dysgonic strains of low virulence for the rabbit to be transitional; I would even go as far as to assert that no truly transitional strains have yet been found.

Susceptibility of Various Species of Animals to Infection.

This question cannot here be treated in any but the briefest manner, yet I cannot wholly pass it over. Table I. is based partly on the result of experimental inoculations, and partly on the natural incidence of disease. The notes appended thereto show that the two do not always run on strictly parallel lines. For want of complete information of either kind it has been found impossible to use the signs indicating susceptibility in a strictly consistent manner. The table must therefore not be taken apart from its context.

Table I. divides the mammals into two groups according to their susceptibility to infection with the human type of tubercle bacillus. To infection with the bovine type all mammals are probably more or less susceptible, and no animal—with the single and doubtful exception of man—is known to be more susceptible to infection with the human type of bacillus than to that with the bovine type of bacillus. A certain group of animals, including man, dog, guinea-pig, monkey, and other foreign mammals, are susceptible to natural infection with both mammalian types of tubercle bacillus. The other group contains practically all our domesticated mammals, except the dog—for example, the ox, sheep, pig, goat, horse, cat, and rabbit. In members of this group the human type of tubercle bacillus when injected causes, as a rule, only local lesions. I have already mentioned exceptions among individual rabbits; concerning the pig I shall presently add something further. This group is sometimes spoken of as the differentiating group.

Avian Infection.

It is curious that the rabbit is almost the only mammal which shows any great susceptibility to infection by the avian type of bacillus. It can easily be infected experimentally with this bacillus, and I have known it, when kept in captivity along with fowls, contract tuberculosis from them. The guinea-pig, if injected experimentally with large doses of avain bacilli, develops a disease in which tubercle bacilli occur in large numbers, in spleen and other organs, without causing any caseation or tubercle formation. The rat and the mouse can also be infected experimentally with avian tubercle bacilli, and there is some reason to think that they may occasionally become spontaneously affected with it, and so be the means of spreading infection from one poultry-farm to another. After intraperitoneal injection with large doses of any of the three types of tubercle bacilli rats slowly develop a chronic and peculiar type of disease, characterised by the inconspicuousness of the lesions, but with all the great organs swarming with multitudes of tubercle bacilli. The donkey is the most resistant to tuberculosis of all our domesticated mammals. Among birds, swans, geese, and ducks are resistant.

Foreign Animals.

Another curious point is that foreign animals kept in captivity seem to be infected at least as often with the human as with the bovine type of bacillus. The former type has been found in many species of monkeys and antelopes, and in elephants.* The case of the parrot is instructive. When kept as a pet it not infrequently develops tuberculosis, and is then commonly found to be infected with the human type of bacillus. In zoological gardens, on the other hand, if it suffers from this disease, the avian type of bacillus is generally the cause of the mischief. At the same time the comparative experiments of F. Griffith have shown that, when tested by inoculation, the bovine type of bacillus is somewhat more virulent for the bird than the two others. Clearly, then, whether the parrot becomes infected with one type of tubercle bacillus

Table I.—*Susceptibility of Certain Animals to Infection with the Three Types of Tubercle Bacilli.*

Susceptible to	Species of animal.	Severity of disease caused by three types of T.B.		
		Human.	Bovine.	Avian.
General infection by bovine type.	Ox, goat, cat	×	+ +	0
	Pig	÷	+ +	÷
	Horse (*a*)	0	+	0
	Rabbit (*b*)	‖	+ + +	+ +
Infection by both bovine type and human type	Guinea-pig	+ + +	+ + +	Y
	Dog (*a*)	+	+	0
	Man	+ +	+	0
	Anthropoid apes and other monkeys	+ + +	+ + +	0
	Other wild mammals in captivity	+ +	+ +	?
	Parrot and cockatoo	+ +	+ +	+ +
	Rat (*c*); mouse	+	+	+
Insusceptible to either type	Fowl, and other domestic birds	0	0	+ +

× A local lesion caused at the seat of inoculation, and disseminated lesions in the lungs, sometimes fatal, after large intravenous injections.
÷ Localised tuberculosis (spontaneous).
‖ Some general disease caused in exceptionally susceptible individuals after subcutaneous injection.
+, + +, + + + Various degrees of progressive tuberculosis.
Y The type of disease described by Yersin, without tubercles or necrosis.
(*a*) Spontaneous tuberculosis relatively uncommon. Difficult to infect artificially.
(*b*) Extremely easy to infect artificially, but seldom if ever tuberculous in its natural state.
(*c*) Spontaneous tuberculosis is rare. After intraperitoneal injection of very large doses rats succumb slowly to a general infection which approximates to the Yersin type of the disease.

* Virulent, that is to say, for the calf, rabbit, goat, etc., for which animals the human type of bacillus has low virulence.

* The camel in Egypt, like other domesticated mammals, when tuberculous, seems to be infected with a bovine type of bacillus (Mason).

rather than another depends more upon opportunity than upon any difference in the virulence of the types for the species of animal.

The Dog.

Although the dog possesses considerable power of resisting tuberculosis its case is somewhat similar. Both mammalian types of tubercle bacilli are capable of infecting this animal. The dog which scavenges for itself in the streets, and the pet dog of a consumptive patient, when they suffer from tuberculosis, are usually infected with the human type; the tuberculous dog of a butcher is likely to be infected with the bovine type. Here, again, opportunity for infection with one type of tubercle bacillus is more important than differences of virulence for the animal of the types themselves. Under no circumstances, however, does the avian type infect the dog.

COMPARATIVE VIRULENCE FOR MAN OF HUMAN AND BOVINE TYPES.

These remarks introduce the question whether the bovine type of tubercle bacillus is more or less virulent for man than the human type. At first sight it might seem, from the fact that the bovine bacillus is only found in a small proportion of fatal cases of human tuberculosis—cases confined, moreover, to very young children whose susceptibility might be supposed to be greatest—that the bovine type of tubercle is for man of considerably lower virulence than the human. But is this really the case? A. S. Griffith thinks that it is not. It might be suggested that if comparative inoculations were made the bovine type would prove a little more virulent for the human being, as for the monkey or the guinea-pig. It has been pointed out that it is easier to infect by the aerial route than by the alimentary route; that the human type of tubercle bacillus has a practical monopoly of this easier route, while the bovine type has no chance of infecting except by the more difficult route of the alimentary canal; consequently the bovine type succeeds, as a rule, only in young children, when susceptibility is high and milk, the chief carrier of bovine bacilli, is taken in large quantities. I think this line of argument is worthy of serious consideration, but the question is a difficult one, and it cannot be fully discussed here.

No attempt is made to indicate in Table I. the relative intrinsic virulence for man of the two types of mammalian tubercle bacilli, for on this head we possess none of the experimental evidence gained in the cases of many of the lower animals. We can, therefore, only record the natural incidence of the two kinds of tuberculous infection, unaided by any laboratory investigation. Thus in the line relating to man, two stars have been placed in the "bovine" column and three in the "human." This must not be taken as prejudging the question of the comparative virulence for man of the two types of bacilli, but merely as indicating the extent to which the two types affect him under existing conditions. In the case of other animal species, however, where the virulence has been measured by sufficient comparative experiments, the table aims at indicating the intrinsic virulence of each type of bacillus for the species of animal in question. For example, the bovine bacillus is credited in the table with high virulence for the rabbit and the avian bacillus with somewhat less; although, so far as I know, the rabbit never, under perfectly natural conditions, suffers from tuberculosis. The virulence of the bacilli for this species has, however, been put beyond question by innumerable experiments.

(To be continued).

Clinical and Case Reports.

The Editor will be glad to receive from members and others contributions to this column of reports of interesting cases

Four Freak Calves.

By J. R. BAXTER, M.R.C.V.S., Lechlade, Glos.

These are all full-time calves.

Bulldog.—Second calf from a Dexter cow by a Shorthorn bull. This calf never breathed, but showed muscular twitchings and heart movements after birth. Cow calved herself and cleaned without trouble.

Hydrocephalous.—The only difficulty in this case was due to the size of the head; the skin surrounding the fluid being very thick. This was, however, easily overcome by inserting an ordinary cattle trocar, when the fluid evacuated under considerable pressure and delivery was accomplished quite easily. The mother progressed quite normally.

Siamese Twin.—The heads, necks and backbone were quite distinct down to end of tail and perfectly

formed. There was only one set of internal organs, and, as will be seen from photo, only four legs, which were quite perfect. This monster was quite lively when I was exploring and the two fore legs were normally presented, but the calf died during delivery. The mother was a big roomy Shorthorn cow and delivery was accomplished with pulleys attached to the fore legs and also a cord round one neck; the other head I turned back behind the shoulder and to my surprise the whole lot came fairly easily. The cow had been some time in labour before my arrival and was somewhat exhausted and did not get on her legs for 24 hours, after which recovery was quite uneventful. (I may say that the owner of this cow was an exceptionally good nurse and undoubtedly helped greatly in her prompt recovery.)

Celosomian.—The skeleton of this calf, if obtained, would, I believe, have been very much like Fig. 114 in Fleming's *Obstretrics* and there described as camylorrhaccis contorta (anyway the name sounds very appropriate). I had a very urgent telephone message over this case to the effect that the cow was putting all her entrails out and the cowman was busy trying to hold them in; however, by the time I arrived on the scene, the cow had beaten the cowman and calved quite easily, and cowman, cow and owner were gazing open-mouthed at the result of her labours. The cowman actually suggested bringing the bull round to see what he thought about it. The cow cleaned and went on absolutely normally.

Anæsthetising the Superior Molars.

The author reviews the advantages of the association of adrenalin with local anæsthetics in equine surgery, based on fourteen years' experience with this method in the Veterinary School at Cureghem, Belgium. Local anæsthesia by cocain-adrenalin has displaced general anæsthesia by chloroform except for certain major operations. The solution used and recommended by the school is as follows:—

Hydrochlorate of cocain.....	30 centigrammes.
Hydrochlorate of adrenalin, 1/1000	5 drops.
Distilled water.....	10 grammes.

This solution produces local insensibility lasting three hours and is a great boon in painful operations. It has been used at the school for some time for equine dental extraction, which is justly considered one of the most painful operations to which the horse is subjected.

A method has been developed which produces complete insensibility of the superior molars. This is accomplished by injecting the solution into the superior dental canal so as to reach the superior maxillary nerve at the point of emergence of the dental branches. The anatomical arrangement is such that the anæsthetic so injected will render insensitive the molars, the canines, the incisors, the sinuses, the upper lip and the nostril on the side injected. The bony canal has a calibre much greater than the volume of the nerve trunk, and the latter is scarcely injured by the introduction of the point of the syringe.

The injection is made with a 5 c.c. Record syringe equipped with a needle 4 to 5 cm. long and 1½ mm. in diameter, but having a round extremity like a cannula instead of a bevelled point. The needle is provided with a blunt-pointed stylet or miniature trocar extending about 1 mm. beyond the cannula. The injection is made through the infraorbital orifice, which is situated under the submaxillary labial muscle, generally a little below a horizontal line passing by the inferior extremity of the malar apophysis, the head being supposed to be held in a vertical position.

The operation is made with equal facility on the animal either lying or standing. With the end of the finger the operator searches for the infraorbital orifice; he glides the thumb from the inferior extremity of the malar apophysis toward the anterior part of the face, lightly pushing aside the submaxillary labial muscle. The opening of the dental canal and the nerve trunk which emerges from it are very easily perceived. Holding the muscle aside toward the median line, by means of a bistoury implanted perpendicularly, he makes in the lower part of the infraorbital orifice a small cutaneous incision involving the entire thickness of the derma. The skin being divided, he introduces the needle armed with its stylet and inserts it as far as possible into the dental canal. This is very easily done, the tissues offering but little resistance. Then he withdraws the stylet, attaches the syringe to the cannula, and proceeds with the injection of 5 c.c. of the cocain-adrenalin solution; then withdraws the needle, and, to prevent the escape of the liquid, compresses the region for one or two minutes. The anæsthesia is complete in 10 or 15 minutes. This operation causes no bad effects, provided the solution is perfectly sterile.

[*A Practical Procedure for Obtaining Complete Anæsthesia of the Superior Molar Teeth of the Horse.* A. VANDEN EECKHOUT. Ann. Méd. Vét., Vol. 66 (1921), pp. 10-14. *Ex. Jnl. Am. Vet. Med. Assn.*]

Notes and News.

The Editor will be glad to receive items of professional interest for these columns.

Foot-and-Mouth Disease.

IMPORTANT YORKSHIRE PROSECUTION.

Joseph Naylor, of Gib Stubbings Farm, New Lane, Tong, Yorkshire, appeared before the Bradford Stipendary Magistrate on the 24th May, and pleaded not guilty to refusing admission to certain lands and buildings to an inspector under the Diseases of Animals Act, 1904, and to refusing admission to a police inspector. Inspector Chapman, prosecuting, said Veterinary Inspector Turner, of the Ministry of Agriculture, went to some farms where there was disease, and then went to the surrounding farms, one of which was defendant's. Defendant asked him if he had been to infected places, and refused to allow him on to Gib Stubbings. The inspector said that he was wearing special rubber clothing, which had been disinfected, but was still refused. He then went and fetched Police Inspector Bone, and this officer was also refused admission. Inspector Turner, in cross-examination, admitted that defendant told him he could come in if he came "clean;" and suggested that he (witness) should come "clean" next day He and Inspector Bone had been on another farm that day where diseased animals were being slaughtered, but witness had thoroughly disinfected his clothes, boots, and hands after leaving. Inspector Bone said he disinfected his boots before leaving the farm where there had been slaughter, and told defendant so.

Defendant said he had had no foot-and-mouth disease on his farm for forty years. He knew the inspectors had been to the other farm, and did not like the look of Inspector Turner's coat, though he did not know it was rubber. It appeared dirty. He denied that Inspector Turner said he had disinfected himself, but Inspector Bone said he washed his boots.

The Stipendiary Magistrate said it was a most important prosecution, having regard to the ravages of the disease. The Ministry of Agriculture sent persons down to take the earliest precautions. On this occasion the Bench recognised that defendant had some grounds for apprehension, knowing that the veterinary inspector had been to other farms, and to one where there had been slaughter. He was, therefore, fearful of people going on to his farm until he was satisfied they had been disinfected. The Bench desired to enforce the precautions of the Act, but there was ground for apprehension, and the summonses would, therefore, be dismissed.

Death of Mr. Lennox Devenish.

Mr. S. van Rensburg, M.R.C.V.S., of Grootfontein, Middleburg, S.A., writes to inform us of the death last month from enteric fever of Mr. Lennox N. Devenish, who qualified at the R.V.C., London, in December, 1918. Mr. Devenish, who was lately stationed at Umyimkulu, in Natal, leaves a wide circle of friends in the profession in England and elsewhere to regret the sad curtailment of a promising career.

Correspondence.

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

All correspondence must bear the name and address of the contributor for publication.

The Editor does not hold himself responsible for the opinions of his correspondents.

R.C.V.S. Council Election.

Sir,—I should be glad if you would give me space in the next issue of the *Record* to express my thanks to those Fellows and members who by their votes have elected me to the Council of the Royal College of Veterinary Surgeons. I shall try my best to be of some use to my profession.—Yours faithfully, GEOFFREY H. LIVESEY.

66 Church Road, Hove, Sussex, *June 17th*, 1922.

Recent Therapeutics.

Sir,—One by one our cherished notions seem to be passing as a result, either of further research or practical application. On p. 377 of the *Veterinary Record* for May 27th, under "A Study of Acaricides," the reader can come to the conclusion that *xylol* and *nitro-benzene* are the two *quickest acaricides*. If he looks up a number of books on therapeutics he will come across a few lines on *xylol* probably, but he will have a great difficulty in finding anything about *nitro-benzine*. For sometime a good many of us have been suspicious about the efficacy of sulphur as an acaricide, and in human medicine its effect has in some cases increased skin irritation. Personally, I use very little of it now. I have found that mange cases in the horse cause me a deal less trouble than they do in the dog. In the latter I have frequently only achieved success with Peruvian balsam, collosol, iodine, or vetiod, and now and then I have not succeeded at all, even with the much vaunted glycerin. hydrarg. biniod.

The skin diseases of the dog want overhauling. I am pretty sure that many of the cases that come under the purview of general practitioners are not correctly designated. One has only to note what a number of skin diseases there are in the human subject which never find mention in *canine pathology*, and, reasoning from analogy, it is almost certain that some of them occur in the dog. Apart from the remarks on sulphur, which I anticipated somebody would make before long, I must state that few things have occasioned me more surprise than the remarks by Mr. J. Park Hamilton, M.R.C.V.S., on the "*Oral administration of Chloroform to Cattle*." I always thought cows were easy animals to choke and *that chloroform did not mix with water*. We all know the old saying that "*alcohol mixes, ether floats, and chloroform sinks*." Wallis Hoare, in the latest edition of his *Veterinary Therapeutics*, states that "unless properly diluted *with mucilage or oil*, it (*i.e.*, chloroform) causes severe irritation of the tongue and buccal mucosa." Finlay Dun (12th edition), *Veterinary Medicine*, remarks that oral doses are given with "syrup, mucilage, whisked egg or weak spirit."

After Mr. Hamilton's experiences we shall even have to revise our cherished ideas about chloroform.—Yours truly, G. MAYALL, M.R.C.V.S.

88 St. George's Road, Bolton, *June 3rd*, 1922.

Clean Milk.

Sir,—I notice that under the heading of "Obiter Dicta," in last week's issue of our Journal, Mr. G. Mayall had some remarks to make with regard to clean milk.

Whilst reading what Mr. Mayall had to say with regard to the essentials of the production of clean milk, I kept on wondering whether he had seen results of the bacteriological count of milk during the different stages of its journey from the teat of the cow to the town consumer.

I join issue with Mr. Mayall's statement that "In fact, one might at most write that the '*fons et origo*' of clean milk rests with the construction of the cow house."

Disgusted as so frequently one is with the sight of cow houses with floors covered with manure inside and large dumps of decaying manure just outside, one, perhaps naturally, concludes that here is the source of the bacteria which find their way into commercial milk.

However strange as it may seem this is not the case, and analysis of the milk as far as the bacterial count is concerned will prove it.

However, far be it from anyone to suggest that dirty cow houses are in the least desirable, as they must be accountable for a certain amount of dirt and bacteria in the milk, and are also a danger as far as the health of the occupants are concerned.

Nevertheless there are people who will guarantee to produce grade "A" milk from (non-tubercular) cows,

housed in ordinary cow houses with the help of a liberal supply of soap and water. Where, then, does the contamination of milk become seriously established, so that, if you take off the lid of a churn at one of the large milk delivery terminals in a town during the warm weather, often the odour given off is more like sewage than milk ?

The answer to this, I venture to state, is that the contamination is contracted mainly from the milk containers.

Whether they be the milking cans at the farm, or the large churns of the owners or the milk depots, the containers of the wholesalers, or, later on, the smaller cans of the retailers, they are all offenders. This contamination is in addition to the dust and dirt which settle on these and become combined with the milk. This accumulation of dirt is often so large that if one asks for a glass of milk at an average tea shop in a large town, the sight of the sediment left at the bottom of the glass makes one wonder from where all of it could possibly have come.

It was, I think, Mr. St. B. Golledge, M.R.C.V.S., who pointed out in a current number of our *Veterinary Record* the danger of the practice of wholesale milk depots in leaving at the side of the road, large churns often exposed to the sun with the lids completely off, collecting quantities of road-side dust. These same churns supplied to the farmer as clean from the wholesale depot are then filled with milk from the farmers' milking buckets. How can such milk, granted it was clean at the source, continue in the same condition ?

Finally, may I point out what is the most important source of the contamination of milk by the containers ? It is their non-sterilised condition. Take any churn, bucket, or metal milk container you will, they all have some corners or seams that are very difficult thoroughly to cleanse—in fact it is almost impossible to do so ; and if these corners could be cleansed we should not then be free from contamination, as the tin or surface of steel is full of minute holes and flaws, which can easily be seen by the naked eye or low-powered lens.

After the churn is emptied a certain amount of milk with a small quantity of bacteria gets left behind—perhaps partly dried on ; the bacteria rapidly multiply, and no cleansing short of sterilisation in a steam box which will take the entire churn will make the container again germ free.

I venture, therefore, to say that the "*fons et origo*," or rather the source, of clean milk is the clean cow ; and by far the greatest offender in the condition of dirty milk is the dirty milk container and not the dirty cow house.—Yours faithfully, W. S. STEVENS, M.R.C.V.S.

Southill, Wincanton.

A Remarkably Low Temperature.

Sir,—May I enquire through the medium of your columns if a temperature of 94° F. has been recorded hitherto in the dog without death ensuing ? Three weeks ago a half-bred wire-haired fox terrier, six months' old, was run over by a motor car. The dog was brought for treatment within ten minutes of the accident. No broken bones could be felt. The patient was in a semi-conscious condition, all the muscles being relaxed, the mucous membranes pallid and the pupils contracted. The respirations were shallow and kept time with the heart beats which were 150 per minute. The pulse was small and weak, temperature 101° F. A 5 grain amyl nitrite capsule was broken under the animal's nose, but made very little difference to the breathing. Being interested in my patient and not alarmed, I waited for ten minutes, when I found the temperature had dropped to 98° F., the respirations were 130. About thirty minutes after the accident the temperature was 96° F. and the respirations 100. As the mucous membranes were pallid I began to suspect internal hæmorrhage, but the pulse had in no way weakened. On taking the temperature again I estimated it to be 94°, as the mercury stood ¼in. below the 95° mark on the clinical thermometer. Two thermometers were used. The temperature had dropped 2° F. every ten minutes. Respiration and pulse 100. I put the patient in front of a fire, gave digitalin hypodermically and teaspoonfuls of brandy and milk every ten minutes, and applied massage. After twenty minutes of this treatment the temperature reached 95° F., and, in an hour, was normal, although the pulse and respiration were 100, and continued so for two days. By the third day the animal was quite lively and fully recovered. The animal vomited ascarides on the second day. They probably were responsible for the bleached mucous membrane. I record the case because it is interesting from a student's point of view, to differentiate between internal hæmorrhage and shock and because of the low temperature. One may ask, had the dog been left untreated would it have succumbed ? or would the temperature have reached a minimum and then returned to normal ?

I should be pleased to see recorded in your columns some of the low temperatures with which practitioners have met.—Yours faithfully, REGINALD C. HOLMES, Royal Veterinary College, London.

A Dog Owners' Complaint.

Dear Sir,—I shall esteem it a very great favour if you will kindly publish the accompanying letter. Due to exaggerated Press notices, a false impression has been given to the public, resulting in numerous anonymous letters being sent, attacking my character and injuring my business.—Thanking you in anticipation, I am, dear Sir, Yours faithfully, A. WILMSHURST.

128 Southwark Park Road, London, S.E., *June* 9th, 1922.

The letter, to which reference is made by our correspondent, is as follows :—

"My dog, a retriever, 18 years of age, a friend and companion for 16 years, fell ill. In consequence of an anonymous letter sent to the Canine Defence League, a lady official called upon me advising me to let her send a veterinary surgeon to examine it. I assented. The assistant secretary and a kennel man called and, declaring that no dog should be allowed to live after 14 years, said it was dying from debility, and advised its destruction. I paid their fee and the dog was killed. Three weeks later an action was entered against me for cruelty and chaining the dog. When the case was heard I found the prosecution had based their charge upon the anonymous letter and a statement that the lady alleged I had made to her that I had kept the dog on the chain for 16 years. I indignantly denied this and stated that I had taken the dog, until old age forbade it, upon Sundays for long rambles, and that as a business man I was compelled for my customers' safety to keep the dog on the chain during business hours (the dog I previously had having severely mauled a customer through being free), but that he almost always had his freedom at night. Four witnesses gave evidence in support, and denied that there was any cruelty. The charge of cruelty fell through, not a single witness being called by the prosecution—but as I could not say that the dog was off the chain every night I was fined 10/- and costs.

"The next morning the case was published with such headings as 'Canine Penal Servitude,' 'Chain Cruelty,' '16 years upon Chain,' etc., etc. The Canine Defence League continued to persecute me by issuing large pictorial posters, particularly in this district, referring to my case and warning the public not to chain dogs.

"These are the real facts and I must leave it to your readers to form an impartial judgment thereon."

A further communication states :—

"I had a very skilled veterinary surgeon, who examined the kennel and took particulars of my treatment of the dog during illness and throughout its life. He stated in Court that I had done everything possible to save the dog, that he could not have improved upon the treatment I had given it and that it was a tribute to my kindness that the animal had been able to reach the age of 18 years. The last weeks of its life I had been feeding it with milk by bottle. The cause of its illness was worms, and to this day I believe it was possible to have saved the dog's life had it not been for the League's interference with me."

Diseases of Animals Acts, 1894 to 1914. Summary of Returns.

Period.	Rabies.		Anthrax.		Foot-and-Mouth Disease.		Glanders (including Farcy).*		Parasitic Mange.		Sheep Scab.	Swine Fever.	
	Cases Confirmed.												
	Dogs.	Other Animals.	Outbreaks confirmed.	Animals attacked.	Outbreaks confirmed.	Animals slaughtered as diseased or exposed to infection.	Outbreaks reported by the Local Authorities.	Animals attacked.	Outbreaks reported by the Local Authorities.	Animals attacked.	Outbreaks reported by the Local Authorities.	Outbreaks confirmed.	Swine slaughtered as diseased or exposed to infection
GT. BRITAIN.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Week ended 10th June, 1922 ...	...	...	3	3	2	16	...	...	15	27	1	21	17
Corresponding Week in 1921	...	...	6	10	2	104	...	...	35	60	6	37	8
Corresponding Week in 1920	...	...	4	4	4	1016	...	...	64	95	1	49	32
Corresponding Week in 1919	6	...	3	3	...	...	1	1	108	219	1	70	38
Total for 23 weeks, 1922 ...	1	...	276	303	1107	54067	...	...	694	1035	409	550	206
Corresponding period in 1921	19	1	275	327	40	2886	5	9	1393	2158	382	596	171
Corresponding period in 1920	4	...	211	246	46	3448	9	16	2486	4279	285	1055	400
Corresponding period in 1919	104	3	91	121	19	1033	13	39	3167	6193	213	789	325

NOTE.—The figures for the current year are approximate only. *Excluding outbreaks in Army horses.

IRELAND.													
Week ended 10th June, 1922...			...	...	...	...	...	...	Outbreaks 1	3	6	51	
Corresponding Week in	1921 ...		...	...	2	5	...	...	1	1	...	2	
	1920 ...		...	..	...	...	..	...	2	2	...	...	
	1919 ...		...	...	...	...	...	...	5	...	...	...	
Total for 23 weeks, 1922			1	1	...	...	...	...	61	124	139	766	
Corresponding period in	1921 ...		...	...	7	62	...	...	43	134	33	210	
	1920 ...		1	1	...	...	1	3	69	148	4	16	
	1919 ...		...	...	..	...	1	1	79	150	18	59	

NOTE.—The figures for the current year are approximate only

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